

## Do windmill parks function as a refugium?

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Many countries are in the process of installing offshore windmill farms to comply with the European obligations to get 20% of their electricity consumption out of renewables by 2020. Two companies already exploit part of their wind farm in the Belgian part of the North Sea, located in a predefined offshore zone near the Dutch EEZ border. As part of the environmental impact monitoring, we investigate the effect of the wind farms on the soft-bottom epibenthic and demersal fish fauna.

The zones where windmills are being built, are located on heavily exposed offshore sandbanks and are naturally characterised by a relatively poor benthic and demersal fish fauna. At least during the first years of exploitation we don't expect spectacular changes in density of the soft-bottom fauna on the top of the sandbanks. However, other species are expected to become more abundant, (in)directly associated with the introduction of hard substrates (in casu the windmills). Secondly, we expect the windmill parks to serve as a refugium for several species, as commercial (bottom disturbing) fishing activities are prohibited inside the parks.

Since December 2010, 55 windmills are operational in the Belwind concession zone (phase-I, 17 km<sup>2</sup>) on the Bligh Bank. On 22 September 2011, we got the first permission to operate an 8m-shrimp trawl between these monopiles from the RV Belgica. Preliminary results indicated the presence of several large individuals (>40 cm) of plaice (*Pleuronectes platessa*), turbot (*Psetta maxima*) and brill (*Scophthalmus rhombus*) inside the windmill park. Similar large-sized individuals of these flatfish species were not caught outside the windmill park on that day. Also during previous monitoring campaigns, no such large individuals were caught, neither in the windmill park (before construction) nor outside the windmill park. Several big plaice were again observed during diving operations in the Belwind park on 22-23 November 2011, for the first time since that type of monitoring started. A plausible explanation is that organisms have a higher chance to survive and to grow bigger inside the windmill parks as fishermen cannot catch them there (fishing not allowed, confirmed by VMS data). However, not only the absence of fishing activities seems to favour soft-bottom species. Small-scale and less-exposed sandy habitats are formed between the rocks and stones that are used to protect the windmills. These may provide perfect refugia for soft-bottom benthic species.

Also, epibenthic species may profit from the introduction of offshore windmill farms. For example, much higher densities of the green sea urchin (*Psammechinus miliaris*) were found in the gullies inside the Belwind park compared to the gullies in the reference area. Again, this is probably correlated with the absence of fishing activities (and the associated bottom disturbance) in the windmill concession zones, in combination with the presence of coarse sediments around the windmills, which is the favourable habitat for green sea urchins.

These preliminary results might indicate that windmill parks can function as a refugium for demersal fish and epibenthic fauna. Of course, further monitoring and targeted research actions are needed to confirm this hypothesis.